

CLAIMS

I claim:

1. A multi-package module comprising stacked first and second packages, each said package including a die attached to a substrate, wherein the first and second substrates are interconnected by wire bonding, and wherein the first package comprises a flip-chip ball grid array package having a flip-chip in a die-up configuration.
2. The multi-package module of claim 1 wherein the second package is a wire bonded land grid array package.
3. The multi-package module of claim 2 wherein the die and wire bonds in the second package are fully encapsulated with a molding material.
4. The multi-package module of claim 2 wherein the second package is peripherally encapsulated to an extent sufficient to cover the wire bonds between the die and the substrate.
5. The multi-package module of claim 2 wherein the second package substrate is a single-metal layer substrate.
6. The multi-package module of claim 1 wherein the flip chip package is provided with an electrical shield.
7. The multi-package module of claim 6 wherein the electrical shield is configured to serve as a heat spreader.
8. The multi-package module of claim 1 wherein the flip chip package includes an RF die.
9. The multi-package module of claim 6 wherein the flip chip package includes an RF die, and the shield serves to limit electromagnetic interference between the RF die and other die in the multi-package module.
10. The multi-package module of claim 1 wherein the first package is provided with an electrical shield.

11. The multi-package module of claim 1 wherein the second package is a stacked die package.
12. The multi-package module of claim 11 wherein adjacent stacked die in the stacked die package are separated by spacers.
13. The multi-package module of claim 1 wherein the second package is stacked over the first package, and wherein the flip-chip die on the first package is provided with an electrical shield.
14. The multi-package module of claim 1 wherein the first package substrate includes an embedded ground plane.
15. The multi-package module of claim 14, the ground plane being configured to serve for heat dissipation.
16. The multi-package module of claim 14, the ground plane being configured to serve as an electrical shield.
17. The multi-package module of claim 1 wherein at least one of the first and the second package is a stacked-die package.
18. The multi-package module of claim 1 wherein the second package is a stacked-die package.
19. The multi-package module of claim 1, further comprising a heat shield.
20. A method for making a multi-package module, comprising
providing a die-up flip chip first package including a first package substrate,
providing a second package including a die and a second package substrate,
stacking the second package over the first package, and
electrically interconnecting the first and second packages by wire bonds connecting
the first package substrate and the second package substrate.
21. The method of claim 20 wherein providing a die-up flip chip first package comprises
providing an unsingulated strip of die-up flip chip first packages.

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22. The method of claim 20 wherein providing a die-up flip chip first package comprises testing die-up flip chip packages for a performance and reliability requirement, and selecting a package meeting the said requirement as a said first package.
23. The method of claim 20 wherein providing a second package comprises testing packages for a performance and reliability requirement, and selecting a package meeting the said requirement as a said second package.
24. The method of claim 20 wherein providing a second package comprises providing a land grid array package.
25. The method of claim 20 wherein stacking the second package over the first package comprises affixing the second package onto a surface of the first package substrate.
26. The method of claim 25 wherein affixing the second package onto a surface of the first package substrate comprises applying an adhesive onto a die attach area of the first package surface substrate and contacting the second package with the adhesive.
27. The method of claim 26 wherein applying the adhesive comprises applying a curable adhesive, and further comprising curing the adhesive.
28. The method of claim 20, further comprising attaching second-level interconnect balls onto the first substrate.
29. The method of claim 20, further comprising encapsulating features over the first substrate with a molding compound.
30. The method of claim 21, further comprising singulating the completed module from the strip.
31. The method of claim 20, further comprising providing the first package with an electromagnetic shield.
32. The method of claim 20, further comprising providing the module with a heat spreader.
33. The method of claim 32 wherein providing the module with a heat spreader comprises performing a drop-in molding operation.

34. The method of claim 32 wherein providing the module with a heat spreader comprises affixing a generally planar heat spreader onto an upper surface of the second package.
35. A mobile communications device comprising a multi-package module according to claim 1.
36. A computer comprising a multi-package module according to claim 1.